Video Facilitator's Guide: Overview

The *Process Standards for Mathematics in Action!* Video Series is a collection of seven classroom videos designed to engage teachers in discussions about the Process Standards for Mathematics (or PSs) that are foregrounded in Indiana Academic Standards for Mathematics. These videos of authentic Indiana K-6 classrooms can be used for individual reflection, as part of a professional development initiative with in-service teachers, or during a pre-service teacher preparation program. Each video is approximately 10 to 20 minutes in length and demonstrates how one teacher incorporated the Process Standards into his or her instruction.

The purpose of this facilitator's guide is to provide general guidance for individuals who lead group discussions about the videos. In this guide, you will find detailed information about the PSs, an overview of the general structure of the video sessions with tips for effective facilitation, and a list of additional resources. Each individual video has its own guide with facilitation notes specific to the video.

Information on the Process Standards for Mathematics

The Process Standards for Mathematics are essential for building students' mathematical understandings. It is important that teachers learn not to focus only on the content standards, but also to incorporate habits of mind that are essential for problem solving in their instruction. The PSs help students think mathematically and use mathematical language, while applying the content to new situations. It is critical that the PSs are embedded into daily instruction and are modeled explicitly by the teachers as well as assessed regularly with intentionality.

The Process Standards demonstrate the ways in which students should develop conceptual understanding of mathematical content, and the ways in which students should synthesize and apply mathematical skills.

Below are brief definitions of each of the eight PSs. These descriptions are provided here for the facilitator, but it is strongly encouraged to have teachers develop their own definitions of the practices through discussion and processing activities.

1. Make sense of problems and persevere in solving them - Students will restate the problem in their own words and then develop a plan to solve the problem. They consistently evaluate their progress and modify their plan as needed. They ask themselves, "Does this make sense?"
2. Reason abstractly and quantitatively – Students can take quantitative representation (like a number or equation) and represent it multiple ways (like an image, drawing, or objects). Additionally, they can represent the problem using real-life contexts. Students can also work in the reverse, taking real-life application and putting the information into a visual or quantitative representation.
3. Construct viable arguments and critique the reasoning of others – Students can explain how they solved a problem using concise language and applied strategies. They can defend their reasoning as well as recognize their own mistakes. They can question others about their strategies also.
4. Model with mathematics – Students can recognize math in real-life and also use mathematical models to solve problems. They may use symbols, pictures, or concrete models to show their thinking and can show relationships to other ideas.
5. Use appropriate tools strategically – Students know when to use certain tools to explore and solve problems. They can determine which tool is appropriate and use it efficiently. Tools can refer to hands-on tools (e.g., protractors, rulers, manipulatives) as well as graphs, charts, visualization strategies, and estimation.
6. Attend to precision - Students are efficient and accurate in both their calculations and explanations. They use the correct terminology symbols, and units when they communicate orally or in written work.
7. Look for and make use of structure – Students see and understand how concepts are organized and can break down structures to make sense of new problems. They also look for patterns in problems.
8. Look for and express regularity in repeated reasoning – Students look for repeated reasoning in problems to develop shortcuts to make problem solving more efficient. The developed shortcuts are tested and then new learning is generalized to new, more difficult problems.

In order to fully understand the processes and their importance, teachers need time to discuss and identify them. It is important for teachers to understand that PSs are not standards that are ever "attained" by individual students within a specific grade level. The PSs should also not be considered standards that a teacher can "check off" as being completed. Rather, students continue to develop their mathematical processes throughout grades K-12, and as students learn new mathematical content, they continue to engage in the mathematical processes in more sophisticated ways. In addition, administrators need to have a strong understanding of the processes so that they can observe them in practice via observations and formal evaluations of teacher performance.

General Structure and Tips for Facilitation of Video Discussions

The videos in the series were specifically designed to help teachers understand the Process Standards for Mathematics and begin to implement them into their daily instruction. It is suggested to use the videos as one part of developing teachers' understanding of the practices. To effectively develop that understanding, teachers will need to participate in ongoing discussion and planning with colleagues.

We recommend that before engaging teachers with video-based professional development, teachers should become familiar with the PSs. If they have not done so before, we recommend participating teachers read the PSs in preparation for the first video-based professional development.

The facilitation of each video-based professional development session follows the same general format, as elaborated below.

1. **Introduce the PSs:** Provide time for the teachers to read and discuss brief descriptions of the PSs. If teachers have participated in professional development on the PSs previously, then this step may be optional or many be abbreviated.
2. **Working the Task:** Before viewing the video, each teacher should have an opportunity to complete the task. It is vitally important that the participating teachers first work the task. This step is important, because as teachers watch the video, they should focus on pedagogical techniques and student thinking, rather than the mathematics of the task. To facilitate working these tasks, we recommend you begin by posing the problem to the teachers, giving them time to work on the problem individually or in small groups, and then discussing and summarizing their mathematical findings as a whole group. Teachers should also identify the task's corresponding Mathematical Content Standard(s).
3. **Viewing the Video:** Before viewing each video, provide context and expectations for viewing the video. Then, distribute the Video Analysis Recording Sheet, and explain that the teachers should use the sheet to record instances of noticing each PS. Make participants aware that when they see a light bulb appear in the lower left corner of the screen, it is an indication that they should pay special attention for the next 1-2 minutes of the video. Some participants may think the light bulb may be the time to write, however it is intended to be a time to watch closely. Have all the teachers view the video together.
4. **Video Debriefing:** After watching the video, participants should discuss the instances of the PSs that they noticed and the pedagogical moves made by the teacher to foster the PSs. Each individual video includes notes in its facilitator's guide about how to coordinate the debriefing. If necessary, have teachers watch sections of the video indicated in the facilitator's guide a second time. Each video has a set of additional questions to prompt discussion.
5. [OPTIONAL] **Student Work Analysis:** Some videos include samples of students' written work. Where appropriate, teachers should use the student work samples to examine students' attainment of the mathematical content and assess the students' development of PSs. (Note: Only selected videos include examples of student work.)

Additional Resources

Learning Connection –Indiana Mathematics

- https://learningconnection.doe.in.gov/UserGroup/GroupDetailFileBookmarks.aspx?ugfid=7692&gid=165

Additional videos

- www.insidemathematics.org
- www.theteachingchannel.org
- http://www.learner.org/series/modules/express/videos/video_clips.html?type=1&subject=math
- http://www.mathsolutions.com/index.cfm?page=nl_wp2b&crid=303&contentid=1491

Tasks and lessons

- www.learnzillion.com (for grades 3 and up)
- www.illustrativemathematics.org
- http://illuminations.nctm.org/